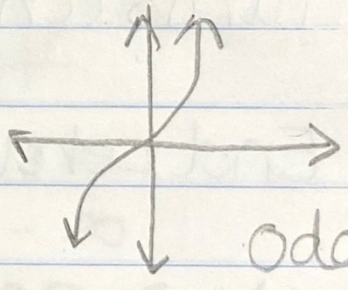
Polynomial

End Behavior

Examples

$f(x) = x^4 + 2x^2 - 3x$

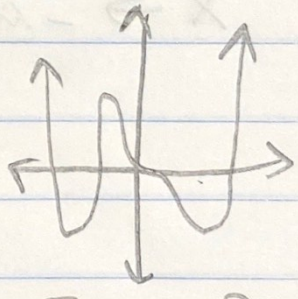
x^4 = EPositive ↑ ↑



odd positive

$f(x) = -x^5 + 3x^4 - x$

$-x^5$ = Odd Negative ↑ ↓



$f(x) = 2x^3 - 3x^2 + 5$

$2x^3$ = Odd Positive

Even Positive

End Behavior - Part II

Look left and right, to figure out what's happening up and down

right

$x \to +\infty$, $f(x) \longrightarrow$ _____ up or down

$x \to -\infty$, $f(x) \longrightarrow$ _____ up or down

left

Example 1:

$f(x) = 12 - 3x^3 + 5x^3 - 7x^4$

$= -7x^4 + 2x^3 + 12$

leading term: $-7x^4$

degree = 4

turns (change in direction) = 4 - 1 = 3

End behavior: Even negative ↙ | ↘

$x \to \infty$, $f(x) \to -\infty$

$x \to -\infty$, $f(x) \to -\infty$

Example 1:

$f(x) = (x+1)^2(x-2)(x-3)$

LT: x^4 Behavior: ↖ | ↗

Notation: $x \to +\infty, f(x) \to +\infty$

$x \to -\infty, f(x) \to +\infty$

Example #2:

$f(x) = -2(x+3)^3(x-2)^2$

LT: $-2x^5$ ON Behavior: ↑ | ↓

Notation: $x \to +\infty, f(x) \to -\infty$

$x \to -\infty, f(x) \to +\infty$

Example #3:

$f(x) = x(x+3)(x+1)(x-1)(x-3)$

LT: x^5 OP Beh.: ↙ | ↗

Notation: $x \to +\infty, f(x) \to +\infty$

$x \to -\infty, f(x) \to -\infty$